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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/084,398	02/25/2002	Neng-Hui Yang	13078.22US01	6880

23552 7590 03/23/2006

MERCHANT & GOULD PC  
P.O. BOX 2903  
MINNEAPOLIS, MN 55402-0903

EXAMINER

BUEKER, RICHARD R

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 03/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/084,398

Applicant(s)

YANG ET AL.

Examiner

Richard Bueker

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 January 2006.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-5,8-10 and 12-22 is/are pending in the application.  
4a) Of the above claim(s) 17-22 is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-5,8-10 and 12-16 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

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Claims 8-10 and 12-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. These claims recite a thermostat device that heats a carrier gas. It is noted, however, that a thermostat is defined as "a device, as in a heating system or an appliance, that senses temperature changes and activates switches controlling the equipment" (see the dictionary definition attached to this office action). A thermostat is not a heater, but rather a control circuit that controls a heater. Therefore, the phrase "thermostat device" should be changed to "heater" in claim 8, lines 15 and 16, claim 10, line 2, and claim 14, lines 21-23.

Claims 10 and 14-16 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. In claims 10-11 and 14-16, the recited infrared ray thermostat device is not properly enabled by the specification as filed. It is noted that applicants have not traversed this rejection. It appears that applicants intend the recited "infrared ray" device to be a heater rather than a thermostat. It is noted that in the second paragraph of page 3 of the specification is stated that "(t)he heating source of this thermostat device can be a heating coil or infrared ray". Therefore, the heating coil or the "infrared ray" is intended to be a heater which is used in conjunction with a thermostat, and it is incorrect for the claims to state that the heating coil or the "infrared ray" is a thermostat.

Claims 1-5, 8-10 and 12-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The newly added limitation of “wherein said first three-way valve isolates said liquid source, said purging gas provider, and said liquid injector from a process gas” contains new matter that was not in applicants’ specification as originally filed. Applicants’ specification at page 3, lines 19-21 states: “The three-way valve disposing between the liquid source and liquid injector, and the three-way valve is used to control access of three pathways here and to isolate from process gases” (the same description is given again at page 5, line 23 to page 4, line 5 of the specification). This passage does not make clear what is being isolated from process gases, and it does not make clear what process gases it is referring to. Applicants’ Fig. 2 illustrates a “process gas” supply pipe that is connected to delivery line 250 at a connection point that is below the second three-way valve 240. It is assumed that the “process gases” that are recited in line 21 of page 3 (and also line 26 of page 5) are the process gases that are supplied by the process gas supply line to delivery pipe 250 as shown in Fig. 2. It is noted, however, that the first three-way valve recited in applicants claims is positioned upstream of the liquid injector 205. As shown in Fig. 2 the first three-way valve 210 is **not** located in a position where it can isolate the liquid injector 205 from process gases introduced into delivery line 250. Applicants are respectfully requested to explain what process gas the liquid injector 205 is isolated from by the first three-way valve 210. Applicants should also point out where in their specification that this newly added claim limitation is described.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4 stand rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Sun (6,409,839). Sun (Fig. 6) discloses a vaporizer having a liquid injector that is inherently a "liquid injection module". A first three-way valve connects the liquid injector to a purge gas provider 72 and a liquid source 14. the discharge line 68 is an exhausting branch. The particular inert gases listed in claim 2 are a recitation of intended use that do not so limit the present apparatus claims.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sun (6,409,839) taken in view of Lei (US 2003/0049933) and Yamamuka (6,110,283). Lei (see Fig. 5, three-way valve 192) and Yamamuka (see Fig. 1, three-way valve at junction of vapor delivery line 17 and vent line 17) each teach the use of a three-way

valve on a gas line down-stream of a vaporizer for connecting the gas line with an exhausting branch (i.e. vent line) and a delivery line that is connected to a CVD reaction chamber. Lei (paragraph 43) teaches that the three-way valve 192 allows source vapor to flow to by-pass the CVD chamber during the process of stabilizing the flow prior to introduction to the CVD chamber. Yamamuka (col. 7, lines 31-33) teaches that his three-way valve can be used for purging unnecessary CVD source material through the exhausting branch 52. It would have been obvious to use a three-way valve of the type taught by Lei and Yamamuka in Sun's apparatus because Lei and Yamamuka teach that such a three-way valve can successfully be used for switching a vapor flow back and forth between an exhausting branch and a CVD chamber delivery line

Claims 1-5, 8, 9 and 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi (JP 2001-250819) taken in view of Lei (US 2003/0049933) and in further view of Sun (6,409,839) and/or Sturm (6,178,925), and also taken in further view of Yamamuka (6,110,283). Noguchi discloses a liquid injection module (see Fig. 9) for vaporizing a source liquid and delivering the vapor to a CVD reactor. Fig. 9 of Noguchi illustrates that the vaporizer includes a liquid injector 41. Noguchi doesn't specifically say that the liquid is atomized, but Lei (see Figs. 6-8) describes the same type of vaporizer, and Lei (paragraphs 41 and 42) teaches that the liquid is atomized in this type of vaporizer, and it is well known in the art, as illustrated by Lei, that atomization inherently occurs in a vaporizer of the type used by Noguchi. Noguchi teaches (see Fig. 4, for example) the use of a purge gas line connected to the source liquid inlet line 46 for purging source liquid from the portion of line 46 that is near the

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heated vaporizer, but Noguchi doesn't teach the use of a three-way valve to connect the purge gas line to the source liquid inlet line 46. Sun (see Fig. 6) and Sturm (see Fig. 1) both also teach the use of a purge gas line for purging source liquid from the source liquid inlet line of a vaporizer. Furthermore, Sun (see valve 70 of Fig. 6) and Sturm (see valve 24 of Fig. 1) both also teach that the purge gas line can be successfully connected to the source liquid inlet line by means of a well-known three-way valve. It is well known in the art that a three-way valve such as valve 70 of Sun or valve 24 of Sturm can be used as a more compact replacement for two valves such as valves 33 and 34 of Fig. 4 of Noguchi. It would have been obvious to one skilled in the art to use a three-way valve to connect the purge gas line to the source liquid inlet line of Noguchi, in view of the teachings of Sun and Sturm that a three-way valve can successfully be used for that purpose. Regarding the "exhausting branch" recited in claim 1, it is noted that Noguchi (see Figs. 1, 6 and 8) also teaches that the vapor delivery line (16 and 17) for delivering vapor to the CVD reaction chamber 1 is connected to a branch line for purged liquid expelled from the vaporizer by purge gas. Also, the particular inert gases listed in claim 2 are a recitation of intended use that do not so limit the present apparatus claims.

It is also noted that Noguchi teaches (see paragraph 9 of the English translation) that an oxidizing gas such as ozone is supplied to the process chamber to react with the vaporized liquid precursor compound (i.e. TEOS) that are supplied by Nogouchi's vaporizer. This oxidizing gas is "a process gas" as recited in applicants' claims as amended.

Regarding claim 5, Noguchi (Figs. 1, 6 and 8) provides valves 7 and 8 to switch his vapor flow into the exhausting branch 18, but he doesn't discuss the use of a three-way valve for this purpose. Lei (see Fig. 5, three-way valve 192) and Yamamuka (see Fig. 1, three-way valve at junction of vapor delivery line 17 and vent line 17) each teach the use of a three-way valve on a gas line down-stream of a vaporizer for connecting the gas line with an exhausting branch (i.e. vent line) and a delivery line that is connected to a CVD reaction chamber. Lei (paragraph 43) teaches that the three-way valve 192 allows source vapor to flow to by-pass the CVD chamber during the process of stabilizing the flow prior to introduction to the CVD chamber. Noguchi (paragraph 10 of translation) teaches that his exhausting branch 18 is used for this same purpose of stabilizing initial flow. Yamamuka (col. 7, lines 31-33) teaches that his three-way valve can be used for purging unnecessary CVD source material through the exhausting branch 52. Noguchi (paragraph 53 of the translation) teaches that his exhausting branch and waste tank 10 are used for the same purpose. It would have been obvious to use a three-way valve of the type taught by Lei and Yamamuka to connect Noguchi's exhausting branch 18 because Lei and Yamamuka teach that such a three-way valve can successfully be used for switching a vapor flow back and forth between an exhausting branch and a CVD chamber delivery line, wherein the exhausting branch is used for the same purposes as in Noguchi.

Regarding the limitation of a heating means located between the liquid injector and carrier gas provider as recited in claims 8-16, it is noted that the heater 44 of



Noguchi's Fig. 9 vaporizer, and also the heater of Fig. 8 of Lei (see also paragraphs 52 and 53 of Lei) are positioned between the liquid injector and a carrier gas provider.

Claims 10 and 14-16 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi taken in view of Lei, Sun and/or Sturm (6,178,925), and taken in further view of Yamamuka (6,110,283) for the reasons stated in the rejection of claims 1-5, 8, 9 and 12-13 above, and taken in further view of Ewing (5,553,188).

Regarding the recited heating coil of claims 10-11 and 14-16, Ewing (Fig. 4, col. 4, lines 41-44 and col. 7, lines 7-10) teaches the use of a heater in the form of a coil to heat a vaporizer. It would have been prima facie obvious to provide the heater 44 of Noguchi's Fig. 9 vaporizer in the form of a coil because Ewing makes clear that a heater in the shape of a coil can successfully be used to heat a vaporizer. It is noted also that the heater 44 of Fig. 9 of Noguchi is located between the liquid injector 41 and the carrier gas provider 38. Furthermore, the heater 44 of Noguchi heats the entire injector valve body, and therefore it inherently heats carrier gas that flows through the carrier gas passageways 38, 43 and 40 that are located in the valve body.

Claims 8-10 and 12-16 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi taken in view of Lei, Sun and/or Sturm (6,178,925), and taken in further view of Yamamuka (6,110,283) for the reasons stated in the rejection of claims 1-5, 8, 9 and 12-13 above, and taken in further view of Nagashima (5,419,924), Chen (6,267,820) and Kanishak (6,086,711). If for argument's sake the heaters of Noguchi and Lei did not read on the heater recited in claims 8-16, such would be obvious in view of Nagashima. Nagashima (see Fig 1, gas heater 18, and also col. 3,

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lines 26-28) teaches that it is desirable to preheat the carrier gas prior to introducing it into a vaporizer. It is noted that Nagashima's vaporizer (see Fig. 4) is the same type of vaporizer as used by Noguchi (see Fig. 9) and Lei (see Figs. 6-8). Sturm (see Fig. 1, element 56) also teaches the use of a carrier gas preheater. It would have been obvious to use a carrier gas preheater of the type taught by Nagashima or Sturm with the vaporizer of Noguchi because Nagashima and Sturm teach that preheated carrier gas can successfully be use to vaporize a source gas. Chen also discloses a vaporizer of the type used by Noguchi, Lei and Nagashima. Chen is cited for his teaching (col. 1, lines 39-44) that this type of liquid injector is susceptible to clogging by reaction with moisture and other contaminants, and thus Chen provides an additional reason why it would be obvious to provide a purge gas to remove liquid from such a liquid injector. Regarding the recited heater coil of claims 10-11 and 14-16, Kanishak (see Fig. 1, element 18, and col. 3, lines 24-27) teaches the use of a heating coil to preheat carrier gas that is used in a vaporizer. It would have been obvious to one skilled in the art to use a heating coil as the carrier gas heater of Nagashima because Kanishak teaches that a heating coil can successfully be use to heat carrier gas.

Applicants have argued that Sun's gas source 72 permits introduction of solvents into the nozzle. A review of Fig. 6 of Sun and also col. 6, lines 33-44 of Sun shows that applicants' argument is incorrect. It is noted that the statement of the rejection over Sun clearly refers to Fig. 6 of Sun. Applicants' argument, however, recites col. 6, lines 49-50 as teaching the use of a solvent. It is noted, however, that col. 6, lines 49-50 of Sun is a

discussion of Fig. 7 of Sun, rather than Fig. 6. Therefore, applicants' comments regarding Sun's use of solvent are not relevant to the stated rejection.

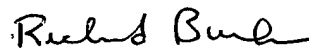
Applicants have argued that Noguchi fails to disclose "a process gas". It is noted, however, that Noguchi does disclose the use of process gases in his apparatus. Noguchi teaches (see paragraph 9 of the English translation) that an oxidizing gas such as ozone is supplied to the process chamber to react with the vaporized liquid precursor compound (i.e. TEOS) that are supplied by Nogouchi's vaporizer. This oxidizing gas is "a process gas" as recited in applicants' claims as amended.

Applicants have argued that "Lei and Yamamuka provide no disclosure or suggestion of coupling a three-way valve to a liquid injection." It is noted, however, that Lei does teach the step of connecting a three-way valve to the output line of his vaporizer, and his vaporizer is illustrated in his Figs. 6-8. It is the same type of vaporizer as that disclosed by Chen, for example. Chen (see abstract, for example) makes clear that this type of vaporizer is "an injection valve" and it is therefore "a liquid injector" as recited in applicants' claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Bueker whose telephone number is (571) 272-1431. The examiner can normally be reached on 9 AM - 5:30 PM, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parvis Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Richard Bueker  
Primary Examiner  
Art Unit 1763